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Proceedings of the regional peer review meeting on the Assessment of the northern Gulf of St. Lawrence (3Pn, 4RS) cod stock

February 19, 2015
Mont-Joli, Quebec

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Foreword

The purpose of these Proceedings is to document the key activities and discussions of the meeting. Proceedings may include research recommendations, uncertainties and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report may be factually incorrect or misleading, but are included to record, as faithfully as possible, what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change to conclusions where additional information was identified as relevant to the topics being considered, but not available within the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as annexes to the proceedings.

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SUMMARY

This document contains the proceedings from the meeting held within the regional assessment process of the northern Gulf of St. Lawrence (3Pn, 4RS) cod stock. This review process was held on February 19 and 20, 2015 at the Maurice Lamontagne Institute in Mont-Joli. More than 40 participants from sciences, industry and management took part. These proceedings contain the essentials of the presentations and discussions held along with the recommendations and conclusions that were presented during the review.

SOMMAIRE

Ce document renferme le compte rendu de la réunion tenue dans le cadre du processus régional d'évaluation de la morue du nord du golfe du Saint-Laurent (3Pn, 4RS). Cette revue, qui a eu lieu les 19 et 20 février 2015 à l'Institut Maurice-Lamontagne à Mont-Joli, a réuni plus d'une quarantaine de participants des sciences, de l'industrie et de la gestion. Ce compte rendu contient l'essentiel des présentations et des discussions qui ont eu lieu pendant la réunion et fait état des recommandations et conclusions émises au moment de la revue.

INTRODUCTION

The Quebec Region of the Department of Fisheries and Oceans (DFO) is responsible for assessing the stocks of several exploited fish and invertebrate species in the Estuary and Gulf of St. Lawrence. Most of these stocks are assessed periodically within a regional advisory process, which is conducted at the Maurice Lamontagne Institute in Mont-Joli. This document consists of the proceedings of the meeting held on February 19, 2015 on the assessment of the cod stock of the northern Gulf of St. Lawrence (3Pn, 4RS).

The objective of the review was to determine whether there were any changes in the resource's status and whether adjustments were required to the management plans based on the chosen conservation approach, the ultimate goal being to provide scientific advice on managing the cod stock in the northern Gulf of St. Lawrence (3Pn, 4RS) for the next two fishing seasons.

These proceedings report on the main points discussed in the presentations and deliberations stemming from the activities of the stock assessment regional committee. The regional review is a process open to all participants who are able to provide a critical outlook on the status of the assessed resources. In this regard, participants from outside DFO are invited to take part in the committee's activities within the defined terms of reference for this review (Appendices 1 and 2). The proceedings also mention recommendations made by the meeting participants.

CONTEXT

Meeting chairperson Martin Castonguay welcomes participants. He highlights the peer review's objectives and agenda. After the participants introduce themselves, the biologist in charge of the review, Claude Brassard, highlights the contribution of his collaborators. He presents the meeting's terms of reference and reviews the summary of the last Science Advisory Report produced in 2012.

Mr. Brassard gives an overview of temperature conditions at the bottom of the Gulf of St. Lawrence. The temperature at 200 m for the entire Gulf has been warmer in recent years compared to the historical series. A few items on the biology of the species (distribution, feeding, predation) are briefly presented.

ASSESSMENT OF THE RESOURCE

COMMERCIAL FISHERY

The total allowable catch (TAC) for the 2012 to 2014 period was 1500 t per year. Landings for those three years totalled 1311, 1206 and 1229 t. The performance indicators for the commercial fishery estimated from fishers' logbooks (longline and gillnet) show an increase from 2010 to 2013 and a slight decrease in 2014. In 2014, they were at average levels (1997–2013). The results of a survey of fishers regarding their fishing yields paints a similar picture.

- It is noted that there is also a recreational cod fishery, but catches are not recorded. According to participants, they would not be significant.
- A question is asked about fishing patterns, which seem to be influenced by the fact that this fishery is not directed solely for cod (e.g. halibut).
- It is pointed out that in years when the catch per unit effort (CPUE) is lower, the proportion of smaller individuals is higher although the gillnet fishery preferentially

targets seven- to nine-year-old individuals (selectivity), which suggests that large individuals were less abundant. This assumption is supported by the fishers' survey.

Data are also presented on cod bycatches in the directed shrimp fishery. Use of the Nordmore grate has helped to considerably reduce cod catches. Cod are found in 25% of trawl tows with observers present, but these catches are still low in most cases (by about 1 kg).

- According to some industry representatives, cod bycatches in the shrimp fishery would be more significant. According to them, when an observer is on board, fishers stay away from sites where there are cod or any other species targeted by the small fish protocol in order to avoid being limited by an area closure.

BIOLOGICAL DATA

Results regarding fecundity, condition index, and proportion of mature individuals are presented. The reproductive potential survey shows a slight downward trend in age at maturity. The condition indices are similar to results obtained in the past. In this regard, there seems to be no concern. However, an industry member does express concern regarding the availability of prey and refers to the capelin decline in 4R.

ABUNDANCE INDICES

The abundance indices come from four surveys: 1) the DFO survey; 2) the mobile-gear sentinel survey; 3) the longline sentinel survey; 4) the gillnet sentinel survey.

Sentinel fishery catch rates (longline and gillnet) rose from 2010 to 2012 and 2013, then fell to the series average (1995–2013) in 2014.

In 2014, abundance indices from the DFO research survey and sentinel fishery trawl survey were above average for their respective series. This increase is attributed largely to year-class abundance from 2011 and 2012. The spatial distribution of cod has expanded in Division 4S and is now similar to that observed in the early 1990s.

- The point is made that care must be taken regarding interpretation of indices for certain areas where there are few fishers (e.g. area 4S).
- The same trend (CPUE) in the fishery is also seen in the fixed gear sentinel fishery (longline and gillnet).
- There is a discussion on the appearance of new cohorts via the consistency-at-age graphs and the index of abundance at age.

CALCULATING THE EXPLOITATION RATE FROM TAGGING DATA

Exploitation rates were estimated from tagging data in 3Pn and 4RS (1995–2014). Arnault Le Bris briefly presents the database, the methodology used, the key results obtained and the study's limitations. Results show a significant drop in the exploitation rate between 2007 and 2014.

- It is noted that the natural mortality parameter used in the tagging study, which comes from ADAPT, creates a certain link between the methods.
- It was also noted that the difference between the two exploitation rate curves (tagging and ADAPT) between 2008 and 2010 could be explained by the fact that fish size is different in each method.

SEQUENTIAL POPULATION ANALYSIS (ADAPT) AND PROJECTIONS

The ADAPT adjustment between the observed and predicted values at age and the distribution of model residuals are described. Also presented are the parameters estimated by ADAPT (catchability at age, natural mortality) and the key results obtained (abundance, recruitment, biomass, exploitation rate, egg production and survival rate). A retrospective analysis (four years) is conducted and input parameters are presented for the projection (2015–2017) and the results obtained with an annual harvest of 1500 t.

Natural mortality estimated by sequential population analysis (SPA) has increased substantially between 2002 and 2014. Possible causes are predation by seals and unaccounted fishing mortality. The estimated exploitation rates from the SPA decreased significantly between 2008 and 2014. Recruitment at age three estimated by the SPA since 1990 is higher in 2007, 2008 and 2009 (2004 to 2006 cohorts) as well as in 2014 and 2015.

The spawning stock's abundance has been in the critical zone, well below the limit reference point, for the last 25 years. Catches in 2015 and 2016 should be kept at the lowest possible level. Projections for 2016 and 2017 indicate that, with an annual harvest of 1500 t (2015–2016 and 2016–2017), the mature biomass should increase. This increase would mainly be related to the abundance of recent 2011 and 2012 cohorts. Their abundance must, however, be confirmed in the coming years.

- Some participants believe that use of a consistent-at-age natural mortality parameter can bias the results.
- A discussion ensues concerning the distribution of model residuals for each survey. Fishers have more faith in fixed gear surveys while Science has more faith in mobile gear surveys. The question remains, "On what survey should the SPA be based?" However, by integrating the surveys, it seems that a realistic enough picture can be obtained.
- There are still uncertainties in estimates at age.
- The picture seems encouraging with regard to the projection-at-age analysis results with a harvest of 1500 t. The 2012 cohort will be the main contributor in 2017. However, caution should be exercised because the stock is far from recovered.
- Fishers are still concerned about predation by seals.

CONSERVATION PLAN AND RECOVERY STRATEGY

Given that we are in the critical zone, a recovery plan stipulating the harvest control rules in the event of an increase or decrease in mature biomass was developed by management, Science and industry. It will eventually be forwarded to the Minister's Office for approval.

CONCLUSION

RESEARCH

Mr. Brassard gives an overview of priority research activities. The following list is presented:

- Assessing the environmental variabilities on the dynamics of exploited stocks;
- Assessing the impact of the directed recreational fishery;
- Continuing studies on the reproductive potential of cod;

- Continuing to monitor cod condition;
- Continuing the tagging program;
- Developing new stock status indices such as range of occurrence and area of occupancy;
- Studying the natural mortality parameter by age group;
- Studying predation by the grey seal.

Participants make some comments.

- There are some who believe that predation by seals must be thoroughly reviewed.
- It is proposed that an abundance index for capelin be obtained, given the concern raised about the availability of this prey.
- Lastly, some participants suggest exploring new analytical approaches, given the limitations of the sequential population analysis.

INTERIM YEARS

Cod stock in the northern Gulf is assessed every two years. For interim years without a stock assessment, the abundance indices from the DFO and sentinel surveys will be monitored.

SUMMARY

The biologist presents the assessment's key findings and participants comment. Only comments regarding content, not on the rewording, are recorded.

- In the highlight on commercial fishery performance indicators, it should be noted that in 2014, they were at average levels (1997–2013).
- Without qualifying the 2011 and 2012 cohorts of strong year-classes, it should be mentioned that the increase in abundance indices from the DFO research survey and sentinel fishery trawl survey is attributed largely to the abundance of 2011 and 2012 year-classes.
- In the highlight on natural mortality, it is agreed to retain the two cases raised, namely predation by seals and unaccounted fishing mortality.
- Regarding the highlight on the exploitation rate, a statement will be included that there was a significant decrease in the estimated rate from the tagging program between 2008 and 2014.
- Following discussion, participants decide to add a highlight to the end of the summary regarding the uncertainty associated with the SPA. It reads as follows: "The SPA diagnostic tools show uncertainties in estimates at age. This has been a recurring problem for several years. However, these uncertainties cast no doubt on the fact that the stock is still in the critical zone. New analytical approaches could be considered."

APPENDIX 1 – LIST OF PARTICIPANTS

Name	Affiliation
Bernier, Denis	DFO – Science
Bourdages, Hugo	DFO – Science
Brassard, Claude	DFO – Science
Brulotte, Sylvie	DFO – Science
Butruille, Frédéric	DFO – Fisheries Management
Castonguay, Martin	DFO – Science
Chabot, Denis	DFO – Science
Chouinard, Pierre-Marc	DFO – Science
Coffin, David	DFO – Fisheries Management
Cotton, Dan	ACPG
Cyr, Charley	DFO – Science
Denis, Marcel	ACPG
Desgagnés, Mathieu	DFO – Science
Dubé, Sonia	DFO – Science
Duplisea, Daniel	DFO – Science
Emond, Kim	DFO – Science
Gagnon, Yves	DFO – Science
Gauthier, Johanne	DFO – Science
Gilbert, Michel	DFO – Science
Lambert, Yvan	DFO – Science
Le Bris, Arnault	Gulf of Maine Research Institute
Légaré, Benoît	DFO – Science
Lubar, John	DFO – Fisheries Management
Lussier, Jean-François	DFO – Science
McQuinn, Ian	DFO – Science
Morneau, Renée	DFO – Science
Nadeau, Paul	LNSFA
Nozères, Claude	DFO – Science
Plourde, Stéphane	DFO – Science
Robert, Dominique	Memorial University of Newfoundland – Marine Institute
Sainte-Marie, Bernard	DFO – Science
Schwab, Philippe	DFO – Science
Spingle, Jason	FFAW
St-Pierre, Sylvie	DFO – Science
Thiboutot, Chantale	DFO – Fisheries Management
Thorne, Marilyn	DFO – Science
Trottier, Steve	DFO – Science
Vanier, Caroline	DFO – Science

APPENDIX 2 – TERMS OF REFERENCE

ASSESSMENT OF COD STOCKS IN THE NORTHERN GULF OF ST. LAWRENCE (3PN, 4RS)

Regional peer review – Quebec Region

February 19–20, 2015
Mont-Joli, Quebec

Chairperson: Martin Castonguay

Context

Landings in cod fishery in the northern Gulf of St. Lawrence are primarily from fixed gear (handlines, longlines and gillnets). The resource is managed mainly by annual TACs (total allowable catches) and a series of other management measures.

At the request of the fisheries management Branch, resource assessment is done every two years. The purpose of the review is to determine whether changes have occurred in the status of the resource that would justify adjustments to the management plan based on the retained conservation approach.

Objectives

Provide scientific advice on cod stock status in the northern Gulf of St. Lawrence (3Pn, 4RS). This advice shall include:

- Description of the biology of northern Gulf cod and its distribution;
- A summary of oceanographic conditions in the Gulf;
- A description of the cod fishery, including landings, fishing effort, catch per unit effort, biological data, and cod bycatches in other fisheries;
- A review of other potential sources of information concerning fishing activities that are complementary to official statistics;
- Analysis of data from the DFO annual research trawl survey in August and sentinel fisheries with mobile gears (July) and fixed gears (gillnets and longlines);
- Analysis of biological indicators related to condition, growth and maturity;
- A sequential population analysis (SPA) to derive trends in terms of spawning stock, recruitment and mortality;
- Analysis of trends of a number of indicators relevant to abundance, productivity, and fishing mortality;
- Projections for 2015 and 2016 based on the assessment of trends in the abundance indices and other stock indicators compared to baseline conservation thresholds (limit reference point);
- Identification of monitoring indicators of the stock status during the interim years; and
- Identification and prioritization of research projects to be considered for the future.

Expected publications

- Science Advisory Report on the northern Gulf of St. Laurence (3Pn, 4RS) cod stock
- Research document
- Proceedings containing a summary of discussions

Participation

- Fisheries and Oceans Canada (DFO) (Science and Fisheries Management sectors)
- Fishing industry
- Province
- Aboriginal communities/organizations
- External experts